

- **Regan Robertson** Mod • 14 days ago

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**Regan Robertson** Mod • 14 days ago • edited

The previous presentation goes a few minutes longer, but we will start this presentation immediately, and you won't miss any content.

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**Ammar S Salman** Regan Robertson • 14 days ago

Thank you for the heads up.

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**Nathaniel Husted** • 14 days ago

For what it's worth, as a user accessing tutorials, I generally prefer leveraging package managers vs. being handed a dockerfile. Arguably I think it leads to more robust documentation as you have to make sure your steps to build the build environment are accurate -- it's potentially easier to miss things when just spinning up a docker container.

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**Nathaniel Husted** Nathaniel Husted • 14 days ago

As an additional note, this has allowed us to do some relatively "crazy" things like getting an seL4 tutorial build environment spun up under Windows Subsystem for Linux V2.

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**Ammar S Salman** Nathaniel Husted • 14 days ago

This is quite interesting, I will try it on my Linux-subsystem as well.

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**Nathaniel Husted** Ammar S Salman • 14 days ago

The biggest curve-ball is to get the nested kvm support working appropriately, you need to register for the cutting edge releases in the Windows Insider Program.

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**Ammar S Salman** Nathaniel Husted • 14 days ago

I see, I guess I'll wait for them to make it to stable Windows first. In the meantime I can still use native Linux or virtualized.

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**Ammar S Salman** Nathaniel Husted • 14 days ago

I agree. Personally I installed everything directly on the machine when I was working on the tutorial. The performance difference between using docker and the other way is noticeable when building the kernel. But in the end, docker can still ensure dependencies are there which is why we prepared the VM with docker instead, as well as having it as the recommended method.

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**Ihor Kuz** Nathaniel Husted • 14 days ago • edited

It's a tradeoff. Inevitably people trying to setup dependencies will have a slightly different environment and so it won't work for them.

Ultimately you want both. And we've evolved our docker scripts so that the setup can be extracted from them and used directly without docker/containers.

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**Nathaniel Husted** Ihor Kuz • 14 days ago • edited

Yah, and I agree overall. It's a difficult situation as for initial ease of use having the 1:1 is nice. However, then when you're trying to build out your toolbox or "customize" it (that whole artisan aspect of what we do) -- docker always seems to be brittle in that sense.

In summary: I wish I could have my cake and eat it too. \*grin\*

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**Ihor Kuz** • 14 days ago

ps\_io\_ops\_t is a part of the driver framework (which I'll talk about later today - though I don't go into details of ps\_io\_ops).

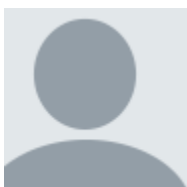
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**Ammar S Salman** Ihor Kuz • 14 days ago

Thank you for letting me know, I will make sure I watch it. The driver framework was quite nice to use once we delved more into its structure. It makes a lot of sense overall.

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**Ihor Kuz** • 14 days ago • edited

It's interesting that you say that CAMkES is too advanced and complicated - it would have made the problem of access to the io ports in a non-root task trivial.

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**Todd Humiston** Ihor Kuz • 14 days ago

We tried to stick with the CoE topic list as defined in the Introductory Level. CAMkES is part of the intermediate level.

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**Axel Heider** Todd Humiston • 14 days ago

You should consider swap this around. Getting started using CAMkES avoids having to dive into some details that you don't really need to care about as application developer. I also started with doing things "manually" and got stuck in stuff that CAMkES handles nicely. Today I have people start with CAMkES in the first place and this allows them implementing things much faster, before they eventually need to understand all the details, e.g. in case of driver writers.

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**Todd Humiston** Axel Heider • 14 days ago

That's great feedback! Thank you for that.

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**Ammar S Salman** Ihor Kuz • 14 days ago

I have went through the CAMkES and did write an initial solution for it, but the tutorial was quite lengthy enough already without going through it. It was the preferred alternative, but the solution provided is still straightforward.

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**Axel Heider** Ammar S Salman • 14 days ago

You have a point there, the CAMkES tutorial could be more comprehensive and show more "real world" usecases that use the "global components".

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**Ammar S Salman** Axel Heider • 14 days ago

I agree.

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**Ammar S Salman** • 14 days ago

Ctags was also brought to my attention during the summit, it also works great if you wish to find functions and source code.

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**Ihor Kuz** • 14 days ago

Summary: we need better seL4 documentation. Yes please! :-)



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**Ammar S Salman** Ihor Kuz · 14 days ago

Exactly. Everything works great once you get your head around it. Documentation can help make this much easier.



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**Nathaniel Husted** Ihor Kuz · 14 days ago

The talk makes me imagine someone getting an seL4 No Satrch Press book written. \*grin\*



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**Ihor Kuz** Nathaniel Husted · 14 days ago

Any volunteers?

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**Axel Heider** Ihor Kuz · 14 days ago

I'd be interested to contribute there, especially if it's a seL4 Foundation activity. Also, our TRENTOS SDK Handbook has around 200 pages now - but it's still barely scratching at the surface of what you can document in various levels (and we avoid the hard core seL4 topics here)

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**Axel Heider** Ihor Kuz · 14 days ago

Actually, what I noticed is, that using CAMkES will hide some of the "missing documentation" issues nicely, because you just don't ever need these parts - unless you eventually start doing "advanced CAMkES".

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**Ihor Kuz** Axel Heider • 14 days ago

Hiding those issues is the intention of something like CAMkES.

However, I've found that the people that have most trouble with CAMkES are those that want to know what is happening and are frustrated that CAMkES hides so much.

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**Ammar S Salman** Ihor Kuz • 14 days ago

That's also true, it provides a decent level of abstraction which can be very helpful, but getting more in-depth requires further digging into undocumented regions.

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**David Talmage** • 14 days ago

The tutorial suffered because of the lack of documentation. For the exercises that weren't solved by copying and pasting, I was frustrated by how hard it was to find answers from the source code.

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**Ammar S Salman** David Talmage • 14 days ago

I'd really love to know which parts you thought were the hardest so we can help improve on them. We really appreciate any feedback we could get!



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**David Talmage** Ammar S Salman • 14 days ago

It was somewhere in exercise-[6789]. Some function args came from fields of structs that had no documentation. I found some function documentation online but that documentation didn't define any of the structs.

It would be helpful for the library source code to have documentation built-in (`/** blah */`) and for the build system to have a target that translates source doc into web pages or Markdown or a PDF.



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**Ammar S Salman** David Talmage • 14 days ago

You are correct, that's why most of this presentation addressed the problems being solved in exercises 6-9. In the tutorial we provided information on functions needed to complete the tutorial, but finding them in the source-code was quite a bit challenging.

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**Renato Levy** David Talmage • 14 days ago

Noted. As we shrank the introductory course that we were aiming for to be offered by the CoE, we did cut some corners.

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**Regan Robertson** Mod • 14 days ago

Please join us for the next session that starts now. You can either go back to agenda to get to the next session or at the bottom of the page there is a next session button.

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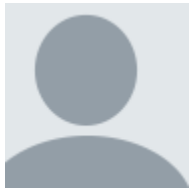
**Ihor Kuz** • 14 days ago

You mentioned working backwards from a desired system. What is the motivation for the pong game's system architecture? Is it intended as a 'best practice' example of how to structure seL4-based systems?

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**Ammar S Salman** Ihor Kuz • 14 days ago

We ultimately wanted an interactive application and ping-pong fit the criteria quite well. Largely because it involves working with drivers and IPC. We know in many cases the GUI isn't necessary when developing seL4, but it was a way to showcase the display driver steps that we had to take. We had hoped to refine the driver for the tutorial even further.

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**Fabrizio Bertocci** • 14 days ago

I have found the new cmake based build system very hard to understand, very fragmented, poorly documented with not a single example I could use as baseline. Both bench/tutoria/test projects rely on scripts specific to that domain to dynamically set variables that are hard to understand. The build system described online does not work (probably is obsolete). Only the seL4 summit tutorials contain those simple CMakeLists.txt that I was looking for months ago. Please document the build system as well!

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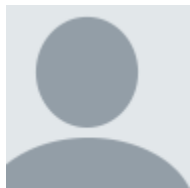
**Ihor Kuz** Fabrizio Bertocci • 14 days ago

I agree.

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**Jeremy** Fabrizio Bertocci • 14 days ago

<https://github.com/manu88/S...> This is a nice tutorial. But it's only for x86. I'm using RISC-V and trying to convert it. It's not trivial. As you noted there is not much documentation.

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**Fabrizio Bertocci** Jeremy • 14 days ago

Actually I was not even aware of that. First time I saw that tutorial.

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**Ammar S Salman** Jeremy • 14 days ago

Thank you for the link. I was unaware of this during development, but we ultimately chose a bit of a different approach that works just as well. As you may know we used cache cmake file to set up the environment for all exercises instead of having the same code copied for each project.

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[Ammar S Salman](#) Fabrizio Bertocci • 14 days ago

This was also frustrating a bit in development and it involved quite a bit of digging to get it done. We ultimately followed what's described on the website even though there are no steps on how to do it. So we had to look at tutorials/test to see how they handled it and simplify it, then we talk about how it's done since it is quite important when you want to start from scratch.

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[Fabrizio Bertocci](#) Ammar S Salman • 14 days ago

Thank you very much really to put together the tutorial. As I said, that is the FIRST time I saw a simple project skeleton that does not depend on external scripts to define variables.

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[Ammar S Salman](#) Fabrizio Bertocci • 14 days ago

I'm very glad to hear this.

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**Ihor Kuz** • 14 days ago

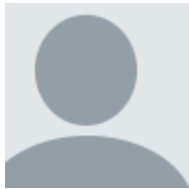
BTW, I enjoyed playing pong. Thanks for making a fun app for the tutorial.

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**Ammar S Salman** Ihor Kuz • 14 days ago

I'm glad you did! That's great to hear.

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**Carl Nerup** • 14 days ago

Forgive the question, but is this not presumptive that seL4 will become the defacto standard for USG?

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**Todd Humiston** Carl Nerup • 14 days ago

Carl, did you mean to submit these questions to the CoE discussion board? The presentations came in rapid succession so you may have seen Jerry's presentation in the same discussion board as where Ammar's was presented.

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**Carl Nerup** Todd Humiston • 14 days ago

Wrong board. On me.

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**Carl Nerup** • 14 days ago

For clarity sake, are you suggesting that people may open source their internally developed SDK up to this repository?

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**Ammar S Salman** Carl Nerup · 14 days ago

I'm not sure I get the question correctly, could you elaborate a bit more?



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**Carl Nerup** Ammar S Salman · 14 days ago

Wrong Board...on me.



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